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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	D. J. Baillargeon, et al.
Serial No.	:	09/498,793
Filed	:	4 February 2000
For	:	FORMULATED LUBRICANT OILS CONTAINING HIGH-PERFORMANCE BASE OILS DERIVED FROM HIGHLY PARAFFINIC HYDROCARBONS
Group Art Unit:	:	1764
Examiner	:	E. M. McAvoy

APPEAL BRIEF

Assistant Commissioner for Patents
Washington, D.C. 20231

1. Real Parties in Interest

The Real ~~Parties~~ in Interest in this Appeal are ExxonMobil Oil Corporation, formerly known as Mobil Oil Corporation, by reason of the original assignment in this application and ExxonMobil Research and Engineering Company, a wholly-owned subsidiary of Exxon Mobil Corporation, by reason of the rights in the patent application vested by agreement in ExxonMobil Research and Engineering Company.

2. Related Appeals and Interferences

There are no related appeals for interferences known to Appellant, Appellant's legal representative or assignee which will directly effect or be directly effected by or have a bearing on the Board's decision in this appeal.

3. Status of Claims

Claims 1-4 and 6-43 are pending in the application.
Claims 1-4 and 6-43 have been rejected in the final rejection.
Claims 1-4, 6-10, 14-43 are the subject of this appeal.

4. Status of Amendments

There are no amendments filed subsequent to the final rejection (Paper No. 9) of 1 April 2002.

5. Summary of Invention

5.1. The present invention relates to lubricant oil formulations, useful as engine oils in internal combustion engines which are characterized by a combination of excellent performance properties including low temperature viscometrics, viscosity index, and biodegradability. The formulations can be made in a number of different viscosity grades according to the generally accepted SAE viscosity grade system, including grades such as 0W (claim 14), 0W40 (claim 16), 0W30 (claim 18), 5W (claim 21), 10W (claim 23), 15W (claim 25), 15W50 (claim 27), 0W20 (claim 37), 5W20 (claim 38), 10W30 (claim 39), 0W30 (claim 40), 5W40 (claim 41), 0W40 (claim 42), 5W50 (claim 43). The combination of the excellent low temperature performance, viscosity index and biodegradable properties is an unexpected characteristic of the present formulations not achieved in known types of lubricants.

5.2. Compositionally, the present formulations comprise a primary basestock which is a branched chain paraffinic hydrocarbon made by the isomerization of certain waxes, especially Fischer Tropsch waxes, in the presence of an isomerization catalyst normally comprising a shape selective zeolite in combination with a hydrogenation-dehydrogenation component such as palladium or platinum (specification, page 10). These paraffinic hydrocarbons are disclosed in W099/20720, which corresponds to U.S. 6,090,989 (Trewella), of record. In addition to the primary branched chain paraffinic basestock, the present formulations comprise additional basestock components such as mineral oils, polyalphaolefins, alkyl aromatics such as long-chain alkyl naphthalenes and esters. Alkylated naphthalenes represent a preferred class of secondary basestock components together with the PAOs and esters of monohydric alcohols with dibasic carboxylic acids especially the esters of the neopentyl glycols with saturated straight-chain antiacids (specification, pages 15-18).

5.3. The formulations may also contain performance additives such as polymeric thickeners (specification page 18), performance additives including oxidation inhibitors, dispersants, detergents, viscosity index improvers, and others (specification, page 20).The use of a combination of a detergent and an antioxidant is important to the properties of the final, formulated lubricant (claim 1).

5.4. The claims on appeal are set out in the attached Appendix.

6. Issues

The issues in this Appeal are:

1. The correctness of the Examiner's conclusion that the claims are unpatentable under 35 USC 103(a) over US 6,090,989 (Trewella);
2. The correctness of the Examiner's finding of fact that Trewella meets the limitations of the liquid lubricant compositions of Applicant's claims (Paper No. 9, pages 3-4);
3 The correctness of the Examiner's finding of fact that the biodegradability of the Trewella paraffinic basestocks may be the same as Applicant's paraffinic basestock. (Paper No. 9, page 4).

7. Grouping of Claims

The following groups of claims are considered separately patentable with respect to one another:

Claim Group 1:	Claims 1, 2, 6, 7, 9, 10, 30 - 36.
Claim Group 2:	Claims 3, 4, 8.
Claim Group 3:	Claim 10
Claim Group 4:	Claims 14 -17
Claim Group 5:	Claims 18-20
Claim Group 6:	Claims 21 - 22
Claim Group 7:	Claims 23 - 24
Claim Group 8:	Claims 25 - 26
Claim Group 9:	Claims 27 - 29

Claim Group 10:	Claim 37
Claim Group 11:	Claim 38
Claim Group 12:	Claim 39
Claim Group 13:	Claim 40
Claim Group 14:	Claim 41
Claim Group 15:	Claim 42
Claim Group 16:	Claim 43

8. The Prior Art Reference

8.1. U.S. 6,090,089 (Trewella) describes paraffinic hydrocarbons suitable for use as lubricant basestocks. The hydrocarbons are wax isomerates which are characterized by the extent of chain branching, as measured by (i) the percentage of methyl hydrogens (BI) and (ii) the proximity of branching, as measured by the percentage of recurring methylene carbons which are four or more carbons removed from an end group or branch (CH_2>4). The characterization is in conformance with the requirements set out in claim 1, i.e.:

(a) BI - 0.5(CH_2>4) > 15; and

(b) BI + 0.85(CH_2>4) < 45.

8.2. These hydrocarbon basestocks may contain conventional type additives in order to formulate a finished oil (col. 3, ll. 50-57). Other basestock components such as esters and poly-alpha olefins may be blended with the wax isomerate to form the finished lubricant (col. 5, ll. 37-42). The performance of these wax isomerates as lubricant compositions is referred to in column 6, lines 1 to 15, where it is stated that the basestocks have extremely low pour points which, notably, may preferably be lower than -40°C (col. 6, l. 3) with high viscosity indices from 130 to 165. Trewella makes no reference to the biodegradability of these hydrocarbons or of lubricants produced from them.

9. The Rejection

9.1. In the Final Rejection (Paper No. 9, page 3) the Examiner stated the rejection:

"Thus, the examiner maintains the position that Trewella meets the limitations of the liquid lubricant compositions of applicant's claims. Although the property of biodegradability is not set forth, the examiner maintains the position that since the paraffinic basestock of the prior art may be the same as applicant's paraffinic basestock, the degree of biodegradability may and most likely is the same".

9.2. In support of this position, the Examiner stated that the limitations in Applicant's claims specifying particular properties of the lubricant compositions were unavailing as to patentability:

"In the response filed 17 January 2001, applicants amended independent claim 1, the only independent claim in the application, to recite that the liquid lubricant composition have "a pour point of form about -25°C to -55°C and a viscosity index of 130 to 160" and argue that the present claims are directed to lubricant compositions which are formulated using paraffinic basestocks which may be within the scope of the Trewella disclosure but which form a more limited sub-class within the broader class described by Trewella. Applicants argue that the paraffinic wax isomerates used in the presently claimed lubricant compositions are defined in terms which include their viscosity index and their pout point, both of which jointly contribute to the production of finished lubricant compositions which have properties, including biodegradability, which are not found in nor reasonably could have been predicted from Trewella. This is not deemed persuasive of patentability because Trewella actually prefers the narrower range of lubricant compositions now claimed by applicants."

10. Appellant's Argument

10.1 General Considerations Applying to all Claim Groups

10.1.1. The present claims are directed to lubricant compositions which are formulated using paraffinic basestocks which concededly may be within the scope of the Trewella disclosure but which form a more limited sub-class within the broader class described by Trewella. The paraffinic wax isomerates used in the presently claimed lubricant compositions are defined in terms including their viscosity index and their pour point and

other properties, all of which jointly contribute to and are significant to the final lubricant compositions "as a whole", the mandate of 35 USC 103.

10.1.2. First, the choice of a limited range of pour points for the wax isomerate, from -25° to -55°C (claim 1 with narrower ranges for other claims) is, for the reasons set out below, contrary to the expectation of what would be expected for best low temperature performance. The expectation would be that the skilled lubricant formulator would normally and logically select the basestock with the lowest pour point for best low temperature performance in the finished lubricant. Instead, however, the finished lubricant with the best low temperature performance is made using a basestock which has a rather *higher* pour point. This is shown in Examples 11 and 12 of the specification with respect to 0W-20 oils. The properties of the basestocks and the finshed oils are set out below in Table 1, using data taken from Tables 8 and 11 of the specification.

Table 1

Formulation Component, Wt.%	**Ex. 11**	**Ex. 12**
Wax Isomerate A-1, Pour Point -66°C	64.1	
Wax Isomerate B-2, Pour Point -40°C		64.1
Co-Base Oil (Ester/Aromatic)	20.0	20.0
PCEO DDI (Additves)	15.9	15.9
Performance		
SAE Viscosity Grade	0W-20	0W-20
KV @ 100°C (cSt)	6.25	6.60
CCS @ -30°C (cP)	2570	2490
HTHS @ 150°C (cP)	2.14	2.35
Pour Point (°C)	-54	-51
MRV @ -40°C (cP/Pa)	9580/<35	8660/<35

Here are two oil formulations made with two basestocks of similar origin (wax isomerates) but with differing pour points, namely, of -66°C and -40°C. The normal expectation of the skilled lubricant formulator would be that the basestock with the *lower* pour point would result in a finished oil with better low temperature performance, for example, a lower formulation pour point, and lower viscosity at low temperatures. This, however, is not what is obtained: the oil made from the basestock with the lower pour point (A-1, -66°C) has a a pour point only slightly lower than the oil made with the same relative amount of basestock of much higher point (B-2, -40°C). More notably, however, is that the oil of Example 12 has significantly lower MRV and CCS values than the oil of Example 11, again illustrating

the advantage of selection of basestock not by the lowest achievable pour point but by appropriate and judicious application of appropriate criteria including basestock pour point.

10.1.3. This finding is replicated in Examples 16 and 18 for 0W-40 formulations, with the relevant data shown below in Table 2, with data taken from Table 13 of the specification.

Table 2

Formulation Component, Wt.%	**Example 16**	**Example 18**
Styrene-Isoprene Polymer	1.4	1.4
Wax Isomerate A-1, Pour Point -66°C	62.7	
Wax Isomerate B-1, Pour Point -34°C		62.7
Co-Base Oil (Ester/Aromatic)	20.0	20.0
PCEO DDI (Additives)	15.9	15.9
Performance		
SAE Viscosity Grade	0W-40	0W-40
KV @100°C (cSt)	12.7	13.5
CCS @ -30°C (cP)	3150	2800
HTHS @ 150°C (cP)	3.54	3.70
Pour Point (°C)	-56	-48
MRV @ -40°C (cP/Pa)	18370/<35	16800/<35

Here, the differential for finished oil performance is even more striking: the two basestocks have widely differing pour points and yet, when formulated into otherwise identical finished lubricants, the basestock with the much lower pour point (Example 16) results in a finished oil with a significantly *higher* CCS and a much *higher* MRV, even though the lower pour point of the basestock oil is carried through to the finished oil (although to a diminished extent). These lower values of viscosity for the are of significance in the formulation of the finished oil because, as explained in the specification, the CCS represents the power required to crank the engine containing the cold oil (lower values are better) and the MRV is representative of the viscosity that the oil achieves under conditions of low temperature and low shear, a pumpability criterion, again related to cold start characteristics.

10.1.4. This property inheres to some extent in the basestock as shown by the comparison in Table 3 below which is drawn from Table10 of the specification:

Table 3

Basestock	Pour Point (°C)	MRV Viscosity (-30°C, cP)	CCS Viscosity (-30°C, cP)
A-3	-60	3060	3060
B-3	-37	2730	2350
C-2	-26	3050	2240
D-3	-18	9210	2110

These data show that there is a definite minimum in the values of the MRV for the basestocks with the intermediate values of pour point (compare basestock B-3 with A-3 and C-2). Note also that basestock A-3 has a higher CCS than basestocks B-3 and C-2 which both have higher pour point.

10.1.5. So, what applicant has done here is to select a *limited* group of the basestocks falling within the scope of Trewella's broad disclosure and determine which are the most apt to make finished oils of good low temperature performance, as measured by standard industry tests. The characteristic selected is the pour point of the basestock and it is selected in a counter-intuitive manner in which there is a definite minimum pour point which is to be followed for best oil performance.

10.1.6 There is also a second factor which is unexpected. It is this: there is an optimum range of viscosity indices for the basestocks which is to be observed for optimal oil performance. While Trewella contemplates the possibility of oils with viscosity indices as high as 165 there is a definite optimal range for this parameter with a maximum of but 160. As reported on page 12 of the specification, the MRV viscosity of the oil (a low temperature performance parameter) deteriorates if the VI exceeds 160. Trewella however, indicates no preference for a limitation on this, a very important property of the basestock.

10.1.7. Thirdly, there is an inverse correlation between the viscosity index of the oil and the biodegradability. The biodegradability of paraffinic hydrocarbons is dependent upon a number of factors, of which one - a major one - is the chain branching characteristic: linear hydrocarbons are more biodegradable than branched chain hydrocarbons. This implies that the wax isomerate hydrocarbon basestocks with lower pour points would be expected, other factors being the same, to have worse biodegradabilities than basestocks of higher pour point because the pour point of paraffinic hydrocarbons is dependent on the linearity

of he hydrocarbons, with low pour points associated with the higher degree of chain branching of the iso-paraffins as opposed to the higher biodegradability of the high pour point, more linear paraffins. PAOs which are made up of branched chain paraffins have excellent low pour points but in general terms are less biodegradable than the paraffins of higher pour point which contain hydrocarbons of a more linear structure. See, for example, U.S. 5,595,966 (of record). While Trewella states nothing about biodegradability, it is unexpected that oils with good biodegradability (correlated with linear paraffinic structure) may be produced while retaining good low temperature performance including low pour point (correlated with iso-paraffinic structure) and high viscosity index (correlated again with iso-paraffin structure). Trewella gives no hint or suggestion that such as result might have been expected or possible.

10.1.8. On the basis of these considerations, it is submitted that there is an unexpected character to the presently claimed lubricants: the finished oils containing the additive package in addition to the basestock do not behave in conformance with the basestock properties. In fact, they have been shown to behave in a manner which is the opposite of what might have been expected from a knowledge of the basestock properties. It is therefore believed that the presently claimed lubricant compositions would not have been obvious to the person of ordinary skill in the art under 35 USC 103.

10.1.9. The Examiner's contention (Paper No. 9, page 3) that Trewella actually prefers the narrower range of lubricant compositions claimed by Applicants is true but only if the preference is made by a careful and judicious selection from among the various ranges set out in the Trewella disclosure aided by the disclosure of the present application, which is not the applicable statutory standard. Specifically, given the objective of making a lubricant composition which has good low temperature performance and good biodegradability, there is nothing in Trewella which would have led the unaided skilled person in the art to select a pour point range of -25°C to -55°C which is only partly within Trewella's preferred range of less than -40C (column 6, line 4). Second, there is nothing in Trewella which would have led the skilled person, unaided, to select a VI range of 130 to 160 which again is only partly within Trewella's preference of 150 -165. The point is that by making this selective combination, Applicants have managed to define a class of lubricants which also meet other criteria relative to lubricant performance including, especially, biodegradability. The same considerations with respect to patentability which

normally are applied to alloy inventions (where overlap of compositional ranges in commonly permitted as long as an overall different result is present) should apply also to the present invention where a new and limited class of qualitatively defined lubricant compositions is at hand.

10.2. Appellant's Arguments for Claim Groups

With respect to the specific groupings of claims set out in Section 7, the following arguments are submitted.

10.2.1 Claim Group 1

10.2.1.1 This group of claims each of which is ultimately dependent on claim 1 defines the lubricant compositions in a relatively broad manner as far as numerical parameters are concerned.

10.2.1.2. In the Final Rejection the Examiner has concluded that Trewella reference meets the limitations of the present liquid lubricant compositions. It is conceded that Trewella discloses the branched-chain paraffinic basestocks and also refers to the possibility of using other basestock components such as PAOs and esters as well as additives such as detergents and antioxidants which are referre dto in certan of this claim group. This is not the end of the matter, however, because it is necessary, for the purposes of 35 USC 103 to consider the invention as a whole. Here, the Examiner failed to consider the significance of the *selective combination* of lubricant formulation characteristics set out in these claims. As pointed above, the claims specify a maximum CCS viscosity at -15°C, coupled with a kinematic viscosity at 100°C of not less than about 5 cSt combined with a pour point of -25°C or lower and a biodegradability of at least 50% OECB 301B. It is this *combination* of properties which would have been unexpected to the person or ordinary skill in the art at the time the invention was made. In particular, the combination of low CCS viscosity at -15°C not more than about 3500 cP, characteristic of a 15W (maximum) grade oil (page 3), indicative of a fair degree of chain branching in the paraffinic molecules making up the basestock, is not taught in Trewella which does not refer to the CCS value at all. This is

not a mere inherent quality of the finished lubricants because, as shown by Tables 1, 2 and 3 above, the CCS viscosity can vary substantially for the finished lubricant formulation without being correlated with the viscosity of the basestocks used in the formulation. Thus, the requirement of this group of claims that the CCS viscosity of the lubricant composition should be a specified maximum represents a selection from the broad range of prior art possibilities and the direction which this selection should take is not taught or suggested by the prior art: Trewella does not indicate the desirability of choosing a specific compositional maximum CCS viscosity which is to be used in combination with the other named lubricant parameters.

10.2.1.3. The limitations on low temperature viscometrics coupled with the biodegradability are considered to render this group of claims patentable there is nothing in Trewella which indicates the possibility of selecting a limited group of branched chain paraffinic hydrocarbons to produce a lubricant composition having the specified combination of low temperature viscometrics and biodegradability. This combination might be considered to be desirable in general terms since it represents a combination of several characteristics each of which might be thought desirable in itself but there is nothing in Trewella which indicates that his paraffinic hydrocarbons could be expected to possess that combination of properties. Thus, it required an exercise of the inventive faculty to determine that a limited subclass of Trewella's compositions could be made to satisfy the requirements of the present claims.

10.2.1.4. As pointed out above, the low temperature properties (pour point, CCS) would indicate to the skilled person that a fair degree of chain branching is present in the basestocks, associated with the good low temperature viscometrics. This characteristic of which the low temperature viscometrics are an indicium is a property which militates against biodegradability: the skilled person would appreciate that biodegradability is best achieved through more linear paraffins with but a limited degree of chain branching.. Therefore, significantly, the combination of the pour point, CCS and biodegradability requirements represents Applicant's resolution of a tension between conflicting requirements for the finished lubricant composition. This resolution has been achieved without suggestion from the prior art: Trewella does not indicate what accommodation, if any is to be made between the viscometric parameters and in order to achieve any biodegradability. In fact, Trewella consistently teaches the use of viscometric

parameters which militate against biodegradability. Note for example, that Trewella states that the most preferred pour points are less than -40°C (column 6, line 4) indicative of the highest attainable degree of chain branching and that a VI of 150-165, again indicative of a high degree of chain branching, is preferred (column 6, line 9).

10.2.1.5. The extent to which the present selection of properties in combination with one another is emphasized by consideration of the Trewella disclosure. The Trewella disclosure extends over a wide range of properties for the hydrocarbons which he describes. Figure 1 of the patent, for example, shows the CCS dynamic viscosities for three different Fischer Tropsch wax isomerates in the range of temperatures from -25° to - 40°C (but not the specified -15°C). From Figure 1 it can be seen that the divergences in CCS viscosity become more marked at lower temperatures, but surprisingly it is not the isomerate with the lowest pour point which achieves the lowest CCS viscosity but rather, the isomerate with the intermediate pour point of 48°C which has the overall lowest CCS viscosity. Nevertheless, differences in low temperature viscometrics would be understood by the skilled person to be indicative and representative of varying degrees of chain branching and branching type in the paraffinic hydrocarbons forming the basestock.

10.2.1.6. Further paraffinic hydrocarbons are shown in Figure 2 of Trewella again illustrating the range of properties which may be possessed by these branched chain paraffins as well as certain other materials including the extra high viscosity index lubes (XHVI), hydrocracked (HDC) lubes as well as the synthetic polyalphaolefins. Assuming, for purposes of convenience, that in making a rejection, the Examiner is using the FT isomerates of Figure 2 (left-hand quadrant of the graph), as representing the closest state of the art. But this group of paraffins in itself represents a broad range of diverse materials and there is nothing in Trewella to indicate that a selection from this broad range could be expected to provide good low temperature viscometrics in combination with good biodegradability.

10.2.1.7. For these reasons, it is submitted that the Examiner's fact finding process in making the rejection of claimed group 1 is faulty as well as the legal conclusion of obviousness based upon it. The Examiner has not advanced any factual basis for concluding that limited subclass of chained paraffins used in the formulation of the

presently claimed lubricants would, in fact, have a biodegradability of at lest 50% CEC, as asserted by the Examiner.

10.2.1.8. The point is that the process of patent examination is to be determined by written evidence of record (35 USC 132) in order to permit adequate review of the record upon any subsequent appeal or further proceedings. See, for example, *Gechter v. Davidson* 43 USPQ 2d 1030, 1033 (Fed. Cir. 1997). The issue is not whether the decision of the Examiner is correct merely because factual findings might have been made and considerations disclosed which would justify the decision but rather, whether there has been a responsible finding of fact based on the record indicating the considerations underlying the action under review. See *SEC v. Chenery*, 318 US 80, 89 to 93 (1943). Here, the Examiner has provided absolutely no factual underpinnings for the unsupported conclusions that the claimed selection would have appeared desirable, not merely possible, to the person of ordinary skill in the art who was confronted with the present problem, of making lubricants which possessed good low temperature viscometrics and good biodegradability. Given therefore that the Examiner's decision is unsupported by any findings of fact, it is inappropriate and should be withdrawn.

10.2.2. Claim Group 2

10.2.2.1. The claims of claim group 2 specify that the MRV viscosity of the lubricant compositions measured at various low temperatures is no greater than 60,000 cP with a yield stress of not more than about 35cP. This characteristic is important for lubricants which are used in passenger car engine oils which must simultaneously meet both the critical low temperature properties of CCS and MRV viscosity, the latter being indicative of viscosity under conditions of low energy, low shear conditions representing the low temperature pumpability of multigrade oils (page 2). There is nothing in Trewella which indicates the desirability or the possibility of making finished lubricants with a specified MRV viscosity and the Examiner has not brought forth any factual support for generalized conclusion that the MRV viscosity would be inherent in any of the specific materials shown in Trewella or of lubricants made from them. It is, of course, conceded that certain materials encompassed by the broad scope of Trewella may or, in fact, will have the specified values of MRV viscosity and yield stress coupled with the other properties of the, by no means inevitable that they will do so not that lubricants made

with them will have the specified viscometrics. See Table 1, 2 and 3 above for proof of this fact. The test for obviousness under 35 USC 103(a) is not that the possibility exists for a specified claimed characteristic to be achieved but rather, that it is inevitable if the prior art teachings are followed. See *In re Benno* 768 F.2d 683, 226 U.S.P.Q. 1340 (Fed. Cir. 1985).

10.2.2.2. The reasons why the combination of MRV viscosity with other measurable characteristics of the lubricant composition renders the claims of this group patentable is that Trewella does not recognize the possibility of achieving the combination of the low temperature viscometrics including MRV with, at the same time, the minimum biodegradability. As pointed out above, the requirements of low temperature viscometrics are in tension with the requirements of good biodegradability and Trewella has nothing to say about biodegradability. Nor has the Examiner brought forth any factual considerations other than a broad, generalized assertion of inherency which does not carry the day nor, indeed, satisfy the fact finding requirements of Chenery, above, or implicit in *In re Zurko* 527 U.S. 150, 119 S. Ct. 1816 (1999). If an agency's reasoning is bound up with a record-based factual conclusion, a reviewing court reviews to determine whether it is supported by "substantial evidence" which implies that there must be "substantial evidence". *In re Gartside* 53 USPQ 2d 1769, 1774 (Fed. Cir. 2000). Here, evidence - substantial or otherwise - in support of the Examiner's contention is lacking: there is nothing in the record to show that the Trewella discloses the claimed MRV viscosities nor that they would have been inherent in the Trewella fluids.

10.2.3. Claim Group 3

10.2.3.1. The claim (claim 10) of claim group 3 which specifies a pour point for the basestock from about -30° to about -45°C are considered to be separately patentable because it is within this range of basestock pour points that the optimal lubricant characteristics may be achieved. In Table 1 above, lubricant made from a basestock with a pour point of -66°C (below the lowest temperature specified in the claim), has a higher MRV than the oil made with a basestock of higher pour point. However, the oil with the basestock of -40°C pour point has a significantly *lower* CCS value than the oil of lower pour point. This illustrates the advantage of selection of basestock not by the

lowest achievable pour point but by appropriate and judicious application of other appropriate criteria, including an intermediate pour point as required by the claims in this group.

10.2.3.2. There is nothing in Trewella which recognizes the importance of making a selection of basestocks according to an intermediate pour point range. Although these intermediate pour point ranges are themselves broadly encompassed by Trewella's generalized disclosure, there is nothing which teaches their use in combination with the other claimed features including VI and biodegradability. As pointed out above, a material may be encompassed by an earlier, broader and more generic disclosure but this does not inevitably give grounds for a rejection under 35 USC 103(a); the invention as a whole, must be rendered obvious by the prior disclosure and there is nothing in Trewella which indicates even the possibility of ensuring a biodegradability of at least 50% with pour points in this specified range.

10.2.4. Claim Group 4

10.2.4.1. The claims of claim group 4 specify that the lubricant composition has a CCS of not more than 3250 cP at -30C with an MRV value of not more than 60,000 cP (-40°C). The claims of this group are considered to be separately patentable because Trewella does not indicate the possibility that finished lubricants based on his fluids would have or be expected to have this property. As pointed out above and shown in Tables 1, 2 and 3 of this brief, the CCS of a finshed lubricant composition is not directly related to or predictable from the basestock properties, even those, e.g. pour point, which might be thought to be most closely related to it. This illustrates the unexpected character of the present invention, namely, that it offers lubricant compositions having a selected combination of desirable properties, the possession of which could not be predicted from the prior art.

10.2.3.2. The added fact that the claims of this group also require a stated MRV is additional proof of patentability in that the MRV values are not taught or suggested by Trewella (see 10.2. 2 above), far less its combination with a specified CCS value and a biodegradability criterion.

10.2.5. Claim Group 5

10.2.5.1. The claims of claim group 5 specify that the finished lubricant composition conforms to the SAE 0W-30 grade. These claims are considered to be separately patentable because they define properties for the finished lubricant (its SAE grade, defined, in turn, by the viscometric criteria set out in Table 1 of the specification, including CCS, MRV and KV) which could not have been predicted from Trewella by the skilled person. As pointed out in connection with Table 1 above, the viscometric properties of finished lubricants are not uniquely predictable from the properties of the basestocks - or, at the least, the Examiner has not adduced any evidence, substantial or otherwise, to negate this proposition as far as it has been applied to the facts of this application.

10.2.5.2. There is therefore no competent finding of fact which shows that the skilled person, reading Trewella, would have considered it desirable and possible to make SAE 0W-30 lubricants from Trewella's fluids. There is nothing in Trewella which recognizes the importance or even the possibility of making an astute selection that leads to a lubricant having good low temperature viscometrics as well as good biodegradability. The earlier, broader and more generic disclosure does not inevitably give grounds for a rejection properly supported under 35 USC 103(a) by substantial evidence of record. The invention as a whole, must therefore be considered unobvious.

10.2.6. Claim Groups 6, 7, 8

10.2.6.1. The claims of these claim groups specify that the finished lubricant composition conforms to certain SAE monogrades, as follows:

Claim Group 6:	5W
Claim Group 7:	10W
Claim Group 8:	15W.

These claims in each of these groups are considered to be separately patentable because they define properties for the finished lubricant (its SAE W grade, defined, in turn, by the viscometric criteria set out in Table 1 of the specification, including CCS,

MRV) which could not have been predicted from Trewella by the skilled person. The reasons set out in the preceding section 10.2.5. apply with like force to this group of claims; the considerations set out there are therefore reiterated here with respect to these claim groups. There is no competent finding of fact which shows that the skilled person, reading Trewella, would have considered it desirable and possible to make the specified SAE grade lubricants from Trewella's fluids. The invention as a whole, must therefore be considered unobvious.

10.2.7. Claim Group 9

10.2.7.1. The claims of claim group 9 specify that the finished lubricant composition are multigrade lubricants conforming to SAE 15W-50 grades. These claims are considered to be separately patentable because they define properties for the finished lubricant (its SAE grade, defined, in turn, by the viscometric criteria set out in Table 1 of the specification, including CCS, MRV and KV) which could not have been predicted from Trewella by the skilled person. The reasons set out in the preceding section 10.2.5. apply with like force to this group of claims; the considerations set out there are therefore reiterated here with respect to this group of claims. There is therefore no competent finding of fact which shows that the skilled person, reading Trewella, would have considered it desirable and possible to make the claimed lubricants having the specified SAE grade characteristics from Trewella's fluids. The invention as a whole, at least as far as covered by these claims, must therefore be considered unobvious.

10.2.8. Claim Groups 10, 11, 12

10.2.7.1. The claims of claim groups 10, 11 and 12 (claims 37, 38 and 39, respectively) specify that the finished lubricant composition is a non-viscosity modified multigrade lubricants conforming to SAE 0W-20, 5W-20 or 10W-30 grades. The reference to them being non-viscosity modified means that no polymeric viscosity modifier (thickener) is present in these oils. These claims are considered to be separately patentable because they define properties for the finished lubricant (its SAE grade, defined, in turn, by the viscometric criteria set out in Table 1 of the specification, including CCS, MRV and KV) which could not have been predicted from Trewella by the skilled person. Further, there is nothing in Trewella which indicates the possibility of

making these moderately cross-graded oils without a viscosity modifier. The reasons set out in the preceding section 10.2.5. apply with like force to this group of claims; the considerations set out there are therefore reiterated here with respect to this group of claims. There is therefore no competent finding of fact which shows that the skilled person, reading Trewella, would have considered it desirable and possible to make the claimed non-viscosity modified lubricants having the specified SAE grade characteristics from Trewella's fluids. The invention as a whole, at least as far as covered by these claims, must therefore be considered unobvious in view at least of the level of fact finding carried out before the Examiner.

10.2.9. Claim Groups 13, 14, 15, 16

10.2.9.1. The claims of claim groups 13, 14, 15 and 16 (claims 40, 41, 42, 43, respectively) specify that the finished lubricant composition is a viscosity modified multigrade lubricants conforming to SAE 0W-30, 5W-40, 0W-40 or 5W-50 grades. These oils are quire widely cross-graded and they are to contain polymeric viscosity modifier (thickener) to provide the desired cross-grading. In respect of their gradings and the presence of the polymeric modifiers, they are distinct from the oils of claim groups 11, 12 and 13. The same considerations advanced for those claim groups therefore apply here: these claims are considered to be separately patentable because they define properties for the finished lubricant (its SAE grade, defined, in turn, by the viscometric criteria set out in Table 1 of the specification, including CCS, MRV and KV) which could not have been predicted from Trewella by the skilled person. Further, there is nothing in Trewella which indicates the possibility of making these widely cross-graded oils. There is therefore no competent finding of fact which shows that the skilled person, reading Trewella, would have considered it desirable and possible to make the claimed widely cross-graded lubricants having the specified SAE grade characteristics from Trewella's fluids. The invention as a whole, at least as far as covered by these claims, must therefore be considered unobvious in view at least of the level of fact finding carried out before the Examiner.

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Claims on Appeal

1. A liquid lubricant composition, comprising

(i) a paraffinic biodegradable hydrocarbon basestock component having a biodegradability of at least 50% (OECD 301B) and having a pour point of from about -25°C to -55°C and a viscosity index of 130 to 160, in which the extent of branching, as measured by the percentage of methyl hydrogens (BI), and the proximity of branching, as measured by the percentage of recurring methylene carbons which are four or more carbons removed from an end group or branch (CH_2>4), are such that:

(a) $BI - 0.5(CH_2>4) > 15$; and

(b) $BI + 0.85(CH_2>4) < 45$;

as measured over said hydrocarbon basestock as a whole, and

(ii) additives soluble in the basestock comprising a detergent and an antioxidant, the liquid lubricant composition having a CCS viscosity at -15°C of not more than about 3500 cP and a kinematic viscosity at 100°C of not less than about 5 cSt.

2. The liquid lubricant composition of claim 1, wherein a combination of dynamic viscosity (DV), as measured by CCS viscosity at -40°C, and kinematic viscosity, as measured at 100°C, of said paraffinic biodegradable hydrocarbon basestock is:

$DV_{@-40°C} < 2900(KV_{@100°C}) - 7000$.

3. The liquid lubricant composition of claim 1, wherein MRV viscosity as measured at -30°C of said paraffinic biodegradable hydrocarbon basestock is not more than about 60,000 cP, with a yield stress of not more than about 35 cP.

4. The liquid lubricant composition of claim 3, wherein MRV viscosity as measured at -40°C of said paraffinic biodegradable hydrocarbon basestock is not more than about 60,000 cP, with a yield stress of not more than about 35 cP.

6. The liquid lubricant composition of claim 1, wherein the viscosity index of said paraffinic biodegradable hydrocarbon basestock is from about 140 to about 160.

7. The liquid lubricant composition of claim 1, wherein the pour point of said paraffinic biodegradable hydrocarbon basestock is less than about -30°C.

8. The liquid lubricant composition of claim 7, wherein MRV viscosity as measured at -35°C of said paraffinic biodegradable hydrocarbon basestock is not more than about 60,000 cP, with a yield stress of not more than about 35 cP.

9. The liquid lubricant composition of claim 7, wherein viscosity index of said paraffinic biodegradable hydrocarbon basestock is from about 140 to about 160.

10. The liquid lubricant composition of claim 7, wherein the pour point of said paraffinic biodegradable hydrocarbon basestock is from about -30°C to about -45°C.

14. The liquid lubricant composition of claim 1 which conforms to SAE 0W low-temperature viscosity grading, and which has CCS viscosity at -30°C of not more than 3250 cP, and MRV viscosity at -40°C of not more than 60,000 cP.

15. The liquid lubricant composition of claim 14 further comprising a polymeric viscosity modifier.

16. The liquid lubricant composition of claim 15 which conforms to SAE 0W-40 grading and which has a kinematic viscosity at 100°C of from 12.5 cSt to less than 16.3 cSt, comprising from about 0.05 to 30 wt% of the polymeric viscosity modifier and wherein the paraffinic biodegradable hydrocarbon basestock has a kinematic viscosity at 100°C of from about 3.5 cSt to about 5.0 cSt.

17. The liquid lubricant composition of claim 16 having a pour point no higher than about -40°C.

18. The liquid lubricant composition of claim 15 which conforms to SAE 0W-30 grading and which has a kinematic viscosity at 100°C of from 9.3 cSt to less than 12.5 cSt, comprising from about 0.01 to about 25 wt% of the polymeric viscosity

modifier and wherein the paraffinic biodegradable hydrocarbon basestock has a kinematic viscosity at 100°C of from about 3.5 to about 5.0 cSt.

19. The liquid lubricant composition of claim 18 having a pour point no higher than about -40°C.

20. The liquid lubricant composition of claim 19 having a CCS viscosity at -30°C of not more than about 3000 cP.

21. The liquid lubricant composition of claim 1 which conforms to SAE 5W low-temperature viscosity grading, and which has CCS viscosity at -25°C of not more than 3500 cP, and MRV viscosity at -35°C of not more than 60,000 cP.

22. The liquid lubricant composition of claim 21 further comprising a polymeric viscosity modifier.

23. The liquid lubricant composition of claim 1 which conforms to SAE 10W low-temperature viscosity grading, and which has CCS viscosity at -20°C of not more than 3500 cP, and MRV viscosity at -30°C of not more than 60,000 cP.

24. The liquid lubricant composition of claim 23 further comprising a polymeric viscosity modifier.

25. The liquid lubricant composition of claim 1 which conforms to SAE 15W low-temperature viscosity grading, and which has CCS viscosity at -15°C of not more than 3500 cP, and MRV viscosity at -25°C of not more than 60,000 cP.

26. The liquid lubricant composition of claim 25 further comprising a polymeric viscosity modifier.

27. The liquid lubricant composition of claim 26 which conforms to SAE 15W-50 viscosity grading and which has a kinematic viscosity at 100°C of from 16.3 cSt to less than 21.9 cSt, comprising from about 0.1 to about 25 wt% of the

polymeric viscosity modifier and wherein the paraffinic biodegradable hydrocarbon basestock has a kinematic viscosity at 100°C of from about 5.5 cSt to about 14.0 cSt.

28. The liquid lubricant composition of claim 27 having a pour point no higher than about -35°C.

29. The liquid lubricant composition of claim 28 having a CCS viscosity at -30°C of not more than about 3300 cP.

30. The liquid lubricant composition of claim 1 which conforms to SAE "xW-y" viscosity grading, where x = 0, 5, 10, or 15, and where y = 10, 20, 30, or 40, and where (y - x) is less than or equal to 25.

31. The liquid lubricant composition of claim 1, wherein said paraffinic hydrocarbon components have BI greater than 26.1 and CH_2>4 less than 22.2.

32. The liquid lubricant composition of claim 1 further comprising a lubricating oil basestock component comprising an ester or an alkylated aromatic or mixtures thereof.

33. The liquid lubricant composition of claim 32 wherein the ester is an ester of a polyol alcohol and a monocarboxylic acid having a kinematic viscosity at 100°C of about 2 cSt to about 8 cSt, and the alkylated aromatic is an alkyl naphthalene having a mono alkyl substituent group of about 10 to about 20 carbon atoms having a kinematic viscosity at 100°C of about 2 cSt to about 8 cSt.

34. The liquid lubricant composition of claim 32 having from about 5 wt% to about 20 wt% of the ester or alkylated aromatic or mixture thereof.

35. The liquid lubricant composition of claim 1 wherein the antioxidant is an aromatic amine or an alkylated phenol or mixtures thereof.

36. The liquid lubricant composition of claim 1 wherein the detergent is an alkali or alkaline earth sulfonate, or an alkali or alkaline earth salicylate, or alkali or alkaline earth phenate, or mixtures thereof.

37. The liquid lubricant composition of claim 1 which conforms to SAE 0W-20 viscosity grading and which is formulated as a non-viscosity modified oil containing no viscosity modifier polymer, in which (i) the paraffinic biodegradable hydrocarbon basestock has a pour point from -30° to -45°C, a viscosity index from 130 to 140, (ii) the composition has a CCS (-30°C) of not more than 3250 cP.

38. The liquid lubricant composition of claim 1 which conforms to SAE 5W-20 viscosity grading and which is formulated as a non-viscosity modified oil containing no viscosity modifier polymer, in which (i) the paraffinic biodegradable hydrocarbon basestock has a pour point from -30° to -45°C, a viscosity index from 130 to 140, (ii) the composition has a CCS (-25°C) of not more than 3500 cP.

39. The liquid lubricant composition of claim 1 which conforms to SAE 10W-30 viscosity grading and which is formulated as a non-viscosity modified oil containing no viscosity modifier polymer, in which (i) the paraffinic biodegradable hydrocarbon basestock has a pour point from -30° to -45°C, a viscosity index from 130 to 140, (ii) the composition has a CCS (-20°C) of not more than 3500 cP.

40. The liquid lubricant composition of claim 1 which conforms to SAE 0W-30 viscosity grading and which is formulated as a viscosity modified oil comprising viscosity modifier polymer, in which (i) the paraffinic biodegradable hydrocarbon basestock has a pour point from -30° to -45°C, a viscosity index from 130 to 140, (ii) the composition has a CCS (-30°C) of not more than 3250 cP at -30C.

41. The liquid lubricant composition of claim 1 which conforms to SAE 5W-40 viscosity grading and which is formulated as a viscosity modified oil comprising viscosity modifier polymer, in which (i) the paraffinic biodegradable hydrocarbon basestock has a pour point from -30° to -45°C, a viscosity index from 130 to 140, (ii) the composition has a CCS (-25°C) of not more than 3500 cP. 41.

42. The liquid lubricant composition of claim 1 which conforms to SAE 0W-40 viscosity grading and which is formulated as a viscosity modified oil comprising viscosity modifier polymer, in which (i) the paraffinic biodegradable hydrocarbon basestock has a pour point from -30° to -45°C, a viscosity index from 130 to 140, (ii) the composition has a CCS (-30C) of not more than 3250 cP.

43. The liquid lubricant composition of claim 1 which conforms to SAE 5W-50 viscosity grading and which is formulated as a viscosity modified oil comprising viscosity modifier polymer, in which (i) the paraffinic biodegradable hydrocarbon basestock has a pour point from -30° to -45°C, a viscosity index from 130 to 140, (ii) the composition has a CCS (-25°C) of not more than 3500 cP.

11. Conclusion

The present invention has not been shown to be obvious under the standards of 35 USC 103(a) as asserted by the Examiner having regard to the findings of fact supported by substantial evidence and by the conclusions drawn from evidence of record. The rejections should therefore be withdrawn.

Respectfully submitted,

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